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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 537,906	03 28 2000	Augustine J. Caffrey	LIT-PI-553	5007

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EXAMINER

LEE, SHUN K

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 01/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/537,906

Applicant(s)

CAFFREY ET AL.

Examiner

Shun Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 28 August 2002 & 07 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1, 10, 16 and 18-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1, 10, 16 and 18-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 28 March 2000 & 10 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 28 September 2002 has been entered.

Claim Objections

2. Claims 23 and 31 are objected to because of the following informalities:
- (a) claim 23 recites the limitation "said high-resolution detector" in lines 2 and 3 (there is insufficient antecedent basis for this limitation in the claim); and
 - (b) claim 31 recites the limitation "said high-resolution detector" in lines 2 and 3 (there is insufficient antecedent basis for this limitation in the claim).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 10 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claim 10 recites the limitation "said peaks and peak centroids" in line 17. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "said gamma-ray spectrum" in line 19. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "said centroid positions" in line 19. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "said gamma-ray peaks" in line 24. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "said energies" in line 24. The antecedent basis for this limitation in the claim is unclear (*i.e.*, is the antecedent basis "gamma-ray peak energies" in line 9 or "energies" in line 21).

Claim 27 recites the limitation "said at least one known chemical" in line 17. There is insufficient antecedent basis for this limitation in the claim. It should be noted that claim 27 depends from canceled claim 17.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vourvopoulos (US 5,982,838) in view of Armistead (US 5,838,759) in so far as understood.

In regard to claim **10**, Vourvopoulos discloses a system for identifying a chemical substance, said system comprising:

- (a) a neutron source (23) for delivering neutrons into said chemical substance;
- (b) a multichannel analyzer (*i.e.*, data acquisition system wherein voltage amplitude corresponds to energy channel; column 4, lines 6-20 and Figs. 2-6) operatively associated with a gamma-ray detector (21);
- (c) a computer (30) operatively associated with said multichannel analyzer; and
- (d) computer code (column 5, lines 28-38 and 64-67) residing within said computer (a computer-readable medium is inherently operatively associated with said computer, said computer-readable medium containing instructions) for controlling said computer to identify said chemical substance by:

storing first data (*i.e.*, response spectrum; Figs. 2-4) representative of first data gamma-ray peak energies corresponding to at least one pre-selected chemical element (column 6, line 59 to column 7, line 13) and said first data in a pre-

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selected order (*i.e.*, sorted) having a first peak energy and a last peak energy (column 6, lines 8-15) ;

receiving second data representative of gamma-ray counts, wherein said gamma rays are generated by said chemical substance as a result of exposure to said neutrons (*i.e.*, experimental spectrum; see Fig. 6), and said second data having second data peaks associated second data peak centroid positions, and said second data in a pre-selected order (*i.e.*, sorted) having a first peak and a last peak (column 7, lines 32-40);

comparing said first data gamma-ray peak energies to said second data peak centroid positions (Fig. 6; column 7, lines 32-37);

calibrating an energy scale of the second data gamma-ray spectrum from said second data peak centroid positions and said first data gamma-ray peak energies so as to allow extraction of second data peak energies corresponding to second data peak centroid positions of said second data peaks (Figs. 2-5; column 7, lines 32-64);

calculating said second data peak intensities of said second data peaks from extracted net areas of said second data peaks and counting times (Figs. 2-5; column 7, lines 32-64);

identifying chemical elements and their ratios contained in said chemical substance from said second data peak energies and said second data peak intensities (Figs. 2-5; column 7, lines 32-64);

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identifying (column 8, lines 19-37) said chemical substance by determining a presence, if any, of a first element selected from the group of phosphorous and chlorine (e.g., Cl; column 6, lines 8-24 and line 59 to column 7, line13), and a presence, if any, of second elements is selected from the group consisting of arsenic, boron, hydrogen, nitrogen, oxygen, phosphorous, sulfur, silicon, titanium and zinc (e.g., S; column 6, lines 8-24 and line 59 to column 7, line13).

The system of Vourvopoulos lacks that the gamma-ray detector is a high purity germanium gamma-ray detector. Gamma-ray detector such as a high purity germanium gamma-ray detector are well known in the art. For example, Armistead teaches (column 6, lines 13-15) that a high purity germanium detector provides superior energy resolution. Therefore it would have been obvious to one having ordinary skill in the art to provide a high purity germanium gamma-ray detector in the system of Vourvopoulos, in order to obtain superior energy resolution.

8. Claims 1, 16, 18-22, 28-30, and 35-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Alfthan *et al.* (US 4,278,885) in view of Armistead (US 5,838,759), Brackenbush *et al.* (US 5,340,990), and Vourvopoulos (US 5,982,838).

In regard to claims **1, 18-22, 28-30, and 38-41**, von Alfthan *et al.* disclose a method comprising:

- (a) exposing (column 1, lines 15-36) said chemical substance to neutrons from an isotopic neutron source;

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- (b) measuring (column 1, lines 15-36), with a semiconductor detector (column 2, lines 16-22), gamma rays emitted by said chemical substance as a result of exposure to said neutrons;
- (c) creating (see Figs. 5 and 6) a single spectrum and a detection count per spectrum channel, said detection count corresponding to the number of detected gamma rays;
- (d) calibrating (column 5, lines 11-45) an energy scale of said spectrum;
- (e) performing (column 5, lines 11-45) a peak-by-peak analysis of the corresponding gamma-ray energies of chemical elements of interest on said spectrum; and
- (f) displaying (column 5, lines 11-45) chemical elements and associated confidence level.

The method of von Alfthan *et al.* lacks that the semiconductor detector is a high purity germanium detector, that the single spectrum have between 4096 and 16384 channels, and to identify and display the identified chemical substance and associated confidence level based on the peak-by-peak analysis of the spectrum. Gamma-ray detector such as a high purity germanium gamma-ray detector and multichannel analyzers are well known in the art. For example, Armistead teaches (column 6, lines 13-15) that a high purity germanium detector provides superior energy resolution and Brackenbush *et al.* teach (column 1, lines 16-35) 8196 channel multichannel analyzer is used to record to energy spectra from germanium detectors over a large number of channels.

Vourvopoulos teaches (column 8, lines 19-37) that an analysis of the spectrum allows chemical substance identification with associated confidence level (using the method

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implicit in the system of Vourvopoulos as discussed above). Therefore it would have been obvious to one having ordinary skill in the art to provide a high purity germanium gamma-ray detector with an associated multichannel analyzer having a large number of channels (e.g., 8196 channels) in the method of von Alfthan *et al.*, in order to obtain superior energy resolution thereby allowing the identification and display of the identified chemical substance and associated confidence level from the analysis taught by Vourvopoulos.

In regard to claim **16** (which is dependent on claim 1) and claims **35-37** (which are dependent on claim 28), the method of von Alfthan *et al.* lacks that data information of known chemical elements (*i.e.*, energy scale calibration) is from gamma-ray peak energies of neutron-induced gamma rays generated from elements (e.g., germanium, bismuth, aluminum, iron, or chlorine) contained within said detector, shielding materials or container materials, independent of fill material, if any, within said container. Vourvopoulos teaches (column 6, lines 65-67) to determine a response spectrum by measuring a sample containing chemical elements of interest. Therefore it would have been obvious to one having ordinary skill in the art to obtain calibration data in the method of von Alfthan *et al.* by measuring elements (e.g., germanium, bismuth, aluminum, or iron) contained within said detector, shielding materials or container materials.

9. Claims 23-26 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Alfthan *et al.* (US 4,278,885) in view of Armistead (US 5,838,759), Brackenbush *et al.* (US 5,340,990), and Vourvopoulos (US 5,982,838)

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as applied to claims 1 and 28 above, and further in view of Arnold *et al.* (US 4,190,768) and Carpenter (US 3,778,627).

In regard to claim **23-26** (which are dependent on claim 1) and claim **31-34** (which are dependent on claim 28), the modified method of von Alfthan *et al.* lacks a step of calibrating an electronic gain of said detector to adjust a known gamma-ray peak to a pre-selected channel of said detector and that said known gamma-ray peak is associated with hydrogen which is generated from neutron interactions within a hydrogenous moderator block comprising polyethylene. Hydrogen energy peak gain stabilization is well known in the art. For example, Arnold *et al.* teach (column 3, lines 43-58) gain stabilization by monitoring a reference peak such as the 2.233 MeV energy peak of hydrogen. Further, Carpenter (column 4, lines 36-48) teach that polyethylene comprises of hydrogen. Therefore it would have been obvious to one having ordinary skill in the art to provide a moderator (e.g., polyethylene) comprising hydrogen in the modified method of von Alfthan *et al.*, in order to stabilize the spectrum by hydrogen energy peak gain stabilization.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (703) 308-4860. The examiner can normally be reached on Tuesday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (703) 308-4852. The fax phone numbers

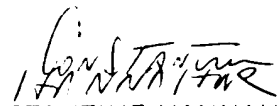
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for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


CONSTANTINE HANNAHER
PRIMARY EXAMINER
GROUP ART UNIT 2878

SL
January 10, 2003